

Docket #72214

## **APPARATUS FOR THE AIR CIRCULATION IN DOUBLE-GLAZED THERMOINSULATED WALLS**

### **CROSS REFERENCE TO RELATED APPLICATIONS**

**[0001]** This application is a United States National Phase application of International Application PCT/IT2004/000564 and claims the benefit of priority under 35 U.S.C. § 119 of BO2003A000639 filed October 29, 2003, the entire contents of which are incorporated herein by  
5 reference.

### **FIELD OF THE INVENTION**

**[0002]** The present invention pertains to an apparatus for the air circulation in double-glazed thermoinsulated walls.

## BACKGROUND OF THE INVENTION

**[0003]** The manufacture of window fittings and building facades frequently uses walls constituted by two panes of glass, mounted parallel to one another and brought together on a frame and creating a space filled with air between them; such walls are commonly known as "double glazing".

**[0004]** The use of such walls is introduced primarily to obtain insulation, both thermal and acoustic, between the interior and exterior environments.

**[0005]** The international patent application WO 20031083242 filed by the Applicant illustrates a double-glazed thermoinsulated wall provided ,with a forced air circulation unit in the space between the two panes of glass, with an air inlet opening connected to the internal environment and positioned at the base of the internal pane and with an air outlet opening connected to the external environment and positioned at the top of the external pane.

**[0006]** In the illustrated solution the air circulation unit comprises a conventional fan electrically powered, fitted with horizontal axis at a circular hole forming the cited air outlet opening positioned at the top of the external pane.

**[0007]** Nevertheless this solution shows some disadvantages that set a limit to its efficiency. In fact the fan causes uneven circulation of air in the space between the two panes of glass. Moreover the presence of the fan together with the its motor drive occupies a considerable

space and causes a sensible noise.

## SUMMARY OF THE INVENTION

**[0008]** The aim of the present invention is to solve the above-mentioned drawbacks by devising an apparatus that allows efficient and silent air circulation in double-glazed thermoinsulated walls, causing a substantial reduction of the space occupied by the apparatus itself.

**[0009]** With regards to this aim, one further purpose of the present finding is to provide with an apparatus for the air circulation which allows to perform any operation of installation and maintenance in an easy way.

**[0010]** Another aim of the present invention is to provide for an apparatus for the air circulation of simple conception, reliable and versatile functioning as well as of reasonable costs.

**[0011]** The above-mentioned objectives can be achieved, according to the present invention, by the apparatus for the air circulation in double-glazed thermoinsulated walls of the type constituted at least by an internal first pane of glass and by an external second pane of glass, positioned parallel to one another and defining a space between them, characterized in that it comprises a tangential fan of reduced size, extended substantially to the full length of the thermoinsulated wall, fitted in a housing realized at the top of the space and opened to the external environment.

**[0012]** The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which preferred  
5 embodiments of the invention are illustrated.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

**[0013]** The only figure is a vertical sectional view of the apparatus for the air circulation fitted in a double-glazed thermoinsulated wall.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0014]** Referring to the figure, 10 refers to the apparatus for the air circulation in a double-glazed thermoinsulated wall 1, particularly suited to windows and building facades.

**[0015]** The double-glazed wall 1 is constituted, as per the state of the art, by a first internal pane 2 and a second external pane 3, positioned parallel to one another and defining a  
15 space 4 between them, which is substantially laminar.

**[0016]** An intermediate pane 5 of glass is preferably fitted between the internal pane 2 and

the external pane 3, parallel to them and act to define in the space 4 a room 6 facing the external environment, for the insertion of a dimming element, of Venetian blind type, which is not illustrated in the drawing.

**[0017]** The room 6 is hermetically sealed, peripherally, by a spacing element 7 of plastic material, which is fitted between the panes of glass 3 and 5.

**[0018]** The pane 2 lowerly presents an air inlet opening 30 in the cited space 4, connected to the internal environment, which is known and not illustrated in the drawing.

**[0019]** The apparatus 10 for the air circulation comprises a tangential fan 11 fitted on a substantially horizontal axis in a housing 12 realized at the top of the space 4 and extended substantially to the full length of the wall 1. The fan 11 is driven at low rotational speed by an electrical motor drive 31 fitted at an end of the housing 12.

**[0020]** The housing 12 is formed by a bearing element 13 constituted by a metal section, for example an extruded aluminum section. The bearing element 13 is bound in a movable way to a frame 14, constituted by a metal section, for example an extruded aluminum one, having a substantially parallelepipedal shape, steadily fixed to the spacer 7 fitted between the panes of glass 3 and 5 by means of clamps 15. The frame 14 presents an opening turned to the inside at the top of the space 4; and an opposite external hole 24 for the air outlet, being both substantially extended longitudinally to the full length of the frame 14. More precisely, the housing 22 is

realized by a substantially cylindrical sector 16 formed by the bearing element 13, having in assembled position a longitudinal opening turned to the space 4, for the air intake through this space, and an opposite opening is turned to the outside for the air outlet. A small door 17, shaping a cylindrical sector too, is fitted swinging at the outlet opening to act as closing member and prevent air from flowing back to the inside when the fan 11 is not operative.

**[0021]** The cylindrical sector 16 of the bearing element 13 extends from a sort of lath 18, opened frontally for the full length, which leans by two orthogonal sides against the internal surface of the frame 14, by the hole 24. The lath 18 is suitably provided with a filtering net 19 to avoid the intrusion of insects or the like.

10 **[0022]** A longitudinal rib 20, suitably inclined, extends upperly from the cylindrical sector 16, as to suit, in fitting position, to a corresponding rib 21 shaped inside the frame 14 and as to be bound to it by conventional screw means 22.

**[0023]** By the opening of the frame 14 a movable door 23 is mounted to allow the inspection of the internal area for any maintenance or cleaning operations. The door 23 lowerly shapes a groove 25 which is act to engage the upper edge of the internal pane 2 of glass by the interposition of a gasket 26, and upperly shapes a curved portion 27 which is act to hook a corresponding folded edge of the frame 14.

**[0024]** It is to notice that the door 23 contributes, by means of its cylindrical shaped

portion, to upperly create the housing 12 of the fan 11.

**[0025]** A covering element 28 is fitted against the frame 14, shaping a sort of cap, constituted by a metal section, for example an extruded aluminum section, extending for the full length of the wall 1. The covering element 28 lowerly presents a longitudinal opening 29 for the  
5 air outlet.

**[0026]** The thermoinsulated wall 1 is meant to be fitted into the suitably provided framework 8, for example by means of a glass-blocking straightedge 9 by means of suitable gasket means. The covering element 28 is advantageously realized in different sizes and so can be associated modularly to the frame 14 according to the thickness of the thermoinsulated wall 1.

10 **[0027]** The functioning of the apparatus for the air circulation in double-gazed thermoinsulated walls is evident on the basis of the previous description.

**[0028]** By operating the fan 11, the air coming from the interior environment is sucked up inside the space 4 and brought outside through the hole 24. The operation of the fan 11 causes the raising the door 17 up to the position indicated as 17a. By circulating through the space 4, when  
15 the apparatus is fully functioning, the air keeps the same temperature as the interior environment does, and allows the thermal insulation between interior and outside environment, thus reducing heat losses.

**[0029]** It is also possible to provide for a condensation sensor 32 which is act to drive a suitable increase of the rotational speed of the fan 11, so as to avoid depositing of water steam condensation produced by the air of the interior environment in case the outside temperature is particularly cool.

5 **[0030]** The above described apparatus achieves the aim to operate the air circulation in double-glazed thermoinsulated walls in efficient and silent way.

**[0031]** In particular, the use of a tangential fan, which is substantially extended to the full length of the wall, allows a considerable reduction of the space occupied by the apparatus itself. The longitudinal extent of the fan 11 causes in fact a corresponding reduction of its diameter,  
10 which permits to minimize the transversal size of the fan itself.

**[0032]** Moreover as a consequence of the cited longitudinal extent, the size of the blades of the fan 11 allows to proportionally reduce the rotational speed of the fan itself, assuring thus a perfectly silent functioning.

**[0033]** The positioning of the tangential fan 11 above the space 4 for the full length of the  
15 wall 1 results in a highly even and linear air circulation, thus turning to the advantage of the efficiency of the apparatus.

**[0034]** Moreover the apparatus turns out to be easily reachable for any maintenance or



cleaning operation, by removing the inspection door 23 which is simply engaged on the internal pane 2 of glass and hooked to the frame 14.

**[0035]** A special quality of the cited apparatus consists in the very easy assembling of the thermoinsulated wall, caused by the fact that no particular working is required during the installation. The apparatus is in fact positioned just inside the wall.

**[0036]** Materials adopted for the actual realization of the invention, as well as their shapes and sizes, can be various, depending on the requirements.

**[0037]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

**[0038]** While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.